256

STATEMENT OF WORK BY THE COMMITTEE ON RESEARCH IN PHYSIOTHERAPY SESSION 1918 - 1919.

Written April 2/19.

ORGANIZATION

In April 1918 Professor J. J. MacKenzie consented to reorganize Physiotherapy Research which had been commenced at Hart House in July 1917, so that it be in close relationship to the University as well as to the Military School O. S. & P. Early in May the following Research Committee of seven was proposed to the President and approved by him:

Professor J. J. MacKenzie, Chairman.
Professor J. J. R. Macleod
Lt-Colonel Robert Wilson
Lt-Colonel C. L. Starr
Major G. Boyer
Captain Hunter
Captain E. A. Bott, Secretary.

This Committee was empowered to accept funds privately subscribed for such research, to decide upon the expenditure of funds under its control, to select problems, and generally to take full charge of the work. The Committee was also empowered to add to its membership as occasion required, and in January 1919 Dr. Burton's name was added. In all the Committee has met five times.

While the Committee considered itself at liberty to investigate any war problems that might seem feasible, it decided to confine its attention for the Session to questions of nerve and muscle repair, as a beginning had been made in that direction.

Assistance other than by donation or grant has come from several sources: The use of space and apparatus has been freely given by the Department of Physiology; the Committee on Medical Experimental Research provided on indefinite loan new animal cages to the value of four hundred dollars; the University provided a full-time graduate laboratory assistant for May and June 1918; the Military School O. S. & P., Hart House, has provided stenographic assistance for the Secretary, full-time research assistants now four in number, also massage operators to give daily treatment to animals as required. Since last summer Professor Hartman has given the closest attention and critical supervision to this research, involving much night work. He is chiefly responsible for such

success as has been obtained. Mr. Blatz has given valuable assistance in operating and testing; Lieut. Kendall and his staff have taken great pains in supervising the massage of animals; Professor Burton is co-operating at present in staging a series in electrical treatment. A splendid esprit de corps has existed in all those assisting in the technical work.

WORK UNDERTAKEN IN ANIMAL RESEARCH IN PHYSIOTHERAPY

In commencing an investigation of processes in nerve and muscle repair it was decided to study first the changes which take place in a muscle following loss of its nerve supply, and secondly the value of massage as a means of preventing atrophy of a denervated muscle.

1. Physiological Changes

Considerable work had been done by earlier investigators on the changes which occur in denervated muscles. Disturbance in circulation following denervation was a point deserving attention. With the assistance of Mr. Blatz and Mr. Kilborn this problem was undertaken by a study of the volumne changes and temperature changes which follow the cutting of the nerve supply of a muscle in rabbits. The following conclusions have been reached.

Volume. Immediately following denervation of a muscle the blood vessles begin to dilate and continue to do so until the muscle becomes congested with blood. This congestion lasts for a few hours. Constriction gradually overcomes this until after a few days the volume is reduced to normal and in some cases may go below the normal. Thus, although the blood supply is at first increased the circulation may later actually become less than normal.

Temperature. In spite of a reduction in circulation the temperature of the muscle may remain above the normal. It is probable that this fact is due to fibrillation. Fibrillation is also possibly responsible for the rapid atrophy of a denervated muscle. An effort is being made to determine the presence and the significance of fibrillation in this connection.

2. Problems of Treatment

The presence of atrophy, often of the most extreme sort in denervated human muscle is a problem of great practical importance. To overcome such atrophy is the object of a considerable amount of treatment given in military hospitals of the surgical type.

The need of ascertaining the cause of such wasting of the muscle, in the hope of preventing and so reducing the wastage, is obvious. This problem has also received attention from other investigators. In particular Langley has investigated the results of different forms of treatment, particularly massage, at Cambridge. The success of experimentation in this field depends upon the technique of testing the condition of the treated muscle. Langley's method was to compare the weight of the treated denervated muscle with that of the corresponding un-treated denervated muscle at the termination of an experiment. This method is open to criticism because it is impossible to take into account the development of active tissue which would affect the weight, and also because he had no means of knowing the relative weights of the muscles before treatment was commenced.

A satisfactory form of test has been developed in this laboratory after many unsuccessful attempts. The principle of the test is to measure the power of the muscle to contract instead of weighing the muscle, the former being a much better criterion of the muscle's condition. The method is to test the relative power of two corresponding muscles before the nerves are cut using an electrical stimulation under an anaesthetic, and recording the strength of contraction graphically, then after cutting the nerves and instituting treatment the same muscles are tested as to function from time to time. The actual effect of treatment of these to be accurately followed. Miss Joan Campbell and Miss Daisy Hearn have given invaluable help in the development and application of this method.

A series of experiments on the effect of massage has been carried on since February 1918, through the assistance of masseuses from the Military School, Hart House. Fifty animals are being treated daily, which number is to be increased shortly to seventy-five. A second series on the effect of galvanic electrical treatment has just been commenced through the help of Professor Burton, and of two additional full-time laboratory assistants from the Military School, Hart House, Miss N. R. Hearn and Miss M. E. Jamieson.

Conclusions can only be drawn from a large series of such experiments. It is expected that both of the present series will be continued at least until June 1919. These series are but a beginning of researches which await development along the lines of testing different forms of therapeutic practices now empirically prescribed. The value of more specific knowledge regarding the effect of such treatments is highly desirable both from a scientific and economical point of view.

F. A. Hartman.

FINANCIAL REPORT

April 2nd, 1919.

Prior to June 26th, 1918 a total of $1217.24 had been expended on this research since its inception. On receiving a University grant of $1500.00 at that time the Committee divided its resources into two accounts, namely:

1. The University grant administered by the Bursar under the title Physiotherapy Special Research.
11. A reserve account known as the Hart House Research Fund.

The receipts and expenditures in these accounts for the current Session to date are classified on the attached statements.

PHYSIOTHERAPY SPECIAL RESEARCH

RECEIPTS

June 26/18 U. of T. Grant.....$1500.00

EXPENDITURE

# Req.	Animals	Care & Food.	Supplies & Equip.	WAGES Mech.	WAGES Tech.	TOTALS Paid	TOTALS Unpaid.
July to Sept. 1918 Incl. Mr. Kilburn.					240.	240.	
PETTY CASH July 3/18			25.			25.	
Aug. 13/18			25.			25.	
Mar. 4/19			25.			25.	
2/126		14.65				14.65	
2/128			29.90			29.90	
2/129			129.60			129.60	
2/130			27.76			27.76	
2/131	13.50					13.50	
2/132			15.00			15.00	
2/133			2.00			2.00	
2/134							
2/135				5.98		5.98	
2/136		10.60				10.60	
2/137				7.00		7.00	
2/138				7.50		7.50	
2/139			6.00			6.00	
2/140			4.43			4.43	
2/141		10.00				10.00	
2/142				8.00		8.00	
2/143		23.20				23.20	
2/144		11.00				11.00	
2/145			9.36			9.36	
2/146	48.75					48.75	
2/147	13.75					13.75	
2/148			6.00			6.00	
2/149			9.60				9.60
2/150			10.75			10.75	
2/151			8.00				8.00
2/152		13.30				13.30	
2/153			11.83			1.75	10.08
2/154			8.00			8.00	
2/155			7.20			7.20	
2/156	37.50					37.50	
2/157		5.00					5.00
2/158			91.05			91.05	
2/159			14.00			14.00	
2/160			31.56			31.56	
2/161			46.20			46.20	
2/162			19.50	9.00		28.50	
2/163	5.00					5.00	
2/164	3.00					3.00	
2/165				12.00		12.00	
2/166			11.00			11.00	
2/167	28.75					28.75	
2/168			5.00			5.00	
2/169			24.00				24.00
2/170			80.00				80.00
2/171					150.	150.00	
2/172			11.00				11.00
2/173				12.00			12.00
	150.25	87.75	693.74	61.48	390.	1223.54	159.68

TOTAL REQUISITIONED	$1383.22
BALANCE	116.78
TOTAL	$1500.00

HART HOUSE RESEARCH FUND

June 26/18 - April 2/19

RECEIPTS

June 26th, 1918	Cash on hand	$25.04
" 26	U. of T. for Vouchers received	999.36
July 13	Sale of Rabbits	1.50
August 14	Sale of Rabbits	41.50
" 28	Hamilton Canadian Club	277.00
October 3	Hamilton Womens' Canadian Club	281.00
	TOTAL	$1625.40

EXPENDITURE

Maintenance of Animals (food, care etc)	38.20
Supplies & Equipment	28.64
Wages, Technicial (Salary of Mr. Blatz May 21- Sept. 30/18)	412.30
	479.14
BALANCE	1146.26
TOTAL	$1625.40

FUTURE OF THE WORK

The Committee feels there is a large field for investigation along physiological lines in this and allied types of research. Equipment and a staff of four trained women laboratory assistants will be available for the continuation of this work during the summer and next year.

To ensure success for the work next Session two points in particular should be safeguarded:

(1) Some experienced research investigator is essential who can take the place of Dr. Hartman in supervising the work to be undertaken.

(2) A grant of at least $2500.00 will be required to carry on physiological phases of the work next year. Should the request of General Fotheringham be granted by the Ottawa Government this need might be at once met. To provide, however, against the possible event of disappointment in this regard, the Committee beg to request, Mr. President, that you make provision to secure a grant of the above amount at least until a decision has been handed down from Ottawa.

J. Mackenzie
Chairman
Research Committee
on Physiotherapy